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NOTES FROM PACIFIC COAST OBSERVATORIES

THE GREAT WHITE SPOT IN THE MARTIAN TROPICS,
JULY 9, 1922

(See Frontispiece, Plate I)

On the night of July 9 there was observed at the Lowell Observatory what proved to be one of the most extraordinary temporary phenomena ever seen on the planet Mars. A large brilliant spot, which had developed since the night before, stood out a conspicuous feature throughout the night's observing, and its position and appearance on the ninth and its subsequent behavior (which, owing to favorable skies, could be followed nightly) make it an object of unusual and immediate interest and one that must throw light on the physical conditions on the planet.

The attention of Dr. V. M. Slipher, who was the first to direct the telescope on Mars the evening of July 9, was at once attracted to a large, brilliant area lying just south of the Margaritifer Sinus region which was then near the central meridian of Mars. The spot, which was a bright creamy-white, was obvious at a glance to all who looked at the planet that night (including one person not familiar with the Martian surface or with telescopic observing). It was slightly less bright than the south polar cap but more brilliant than the north cap, and in tint slightly more yellowish than the south cap. It was oblong in shape and sharply outlined against the planet's background on three sides but showed some diffuseness toward the south cap especially at its following end. The definiteness of the border on the three sides was striking. It was found to measure about twenty-six degrees in longitude and about thirteen degrees in latitude, or fully 800 miles long and 400 miles wide, and thus covered an area of more than 300,000 square miles of the planet's surface. In addition to the visual observations, including measures and drawings, about two hundred photographic images of the planet were made at intervals during the night and all show the bright spot prominently. The plates were

made with both the 24-inch refractor and the 40-inch reflector. The planet was followed as long as it remained above the horizon, and the spot was constantly conspicuous, although it shifted somewhat and changed slightly in form during the course of the night's observations. The diurnal rotation of the planet altered its position on the disk and somewhat its presentation, but the shifting of the spot seemed evident and its described expansion nearly as certain. During the relatively few hours through which the observations could be continued, the north following border appreciably encroached upon the darker background of the planet toward the Fastigium Aryn and the planet's equator, and the spot appeared to have expanded, perhaps mostly in longitude. In the course of the observations there was noted a prominent indentation of dark color about midway along the southern margin of the spot. This, it was suspected, developed or increased after the night's observations began. Otherwise the spot completely hid the underlying surface of the planet.

As soon as the region could be examined on the next night, July 10th, it was at once evident that the bright spot had greatly changed; it had dissolved into a whitish area then hardly recognizable toward the terminator side of the planet's disk. Its brilliancy and definiteness had gone. As the region came farther on the disk it could be studied better. The dissolved spot had spread over a much larger area, having expanded and drifted towards the sunrise side of the disk and also northward, forming an almost semi-circular arch to the right of and centering about Margaritifer Sinus. From the latter marking two grayish streaks radiated across and divided the otherwise unbroken arch in three large sections. Elsewhere the spot concealed the darker background of the planet. Even in its brightest parts it was now much less bright than on the previous night and was at first discernible by the area of dark surface it concealed rather than its outstanding brightness. Thus its visibility depended upon detailed knowledge of the prior appearance of the surface about Margaritifer Sinus. Indeed, probably only the expert observer well acquainted with the surface details of the planet—unless the observing conditions were exceptionally

favorable — would have recognized the phenomenon as it existed on July 10th. Yet both visual and photographic observations then showed the region to be very different in aspect from what it was on either July 9th or on previous dates. Roughly estimated, the spot on the second night involved twice the area it did on the first night.

Observations on the third night, July 11, showed that the region had further changed, being then generally less white, and involving particularly a much smaller area of surface. What remained consisted chiefly of three small, widely separated spots, one lying along the following prong of Dawes Forked Bay, the second south and slightly following Margaritifer Sinus, and the third, considerably larger, lay just south of the equator following Margaritifer Sinus. Excepting the last, these spots were only a few degrees in diameter and so widely separated as to expose much of the dark background about Margaritifer Sinus and hence leave the Martian surface of the region more nearly in its normal appearance.

On the next night, July 12, only a small spot was seen to exist. This followed Margaritifer Sinus, covering the coast line which was normally exposed the night before.

On July 13 and 14 and later nothing was observed that visibly altered the usual aspect of the region.

In addition to the great white spot the observations recorded two rather indefinite and irregular veils of light: the one extended from the following end of the great spot southward and tilted slightly toward the terminator as it neared the south cap; the other, broader and composed of masses extended northward, was tilted markedly to the terminator and lost itself in the extended white about the north pole of Mars. These, while well observed, notably on July 10, were by no means comparable with the great white spot on July 9 in brightness and definiteness. In this connection it seems of interest to note that light patches have been observed in the past rather frequently about the limbs of the planet during the Martian mornings and evenings, i. e., along the limb and terminator. Such a

light area may be noted on the photographs of July 9 along the limb in the northern hemisphere.

It should appear that this spot is an outstanding feature in the recorded history of Mars, because of its size, brightness, unusual tropical location and suggestive behavior, and that it is of most pertinent significance regarding conditions on the planet.

E. C. SLIPHER.

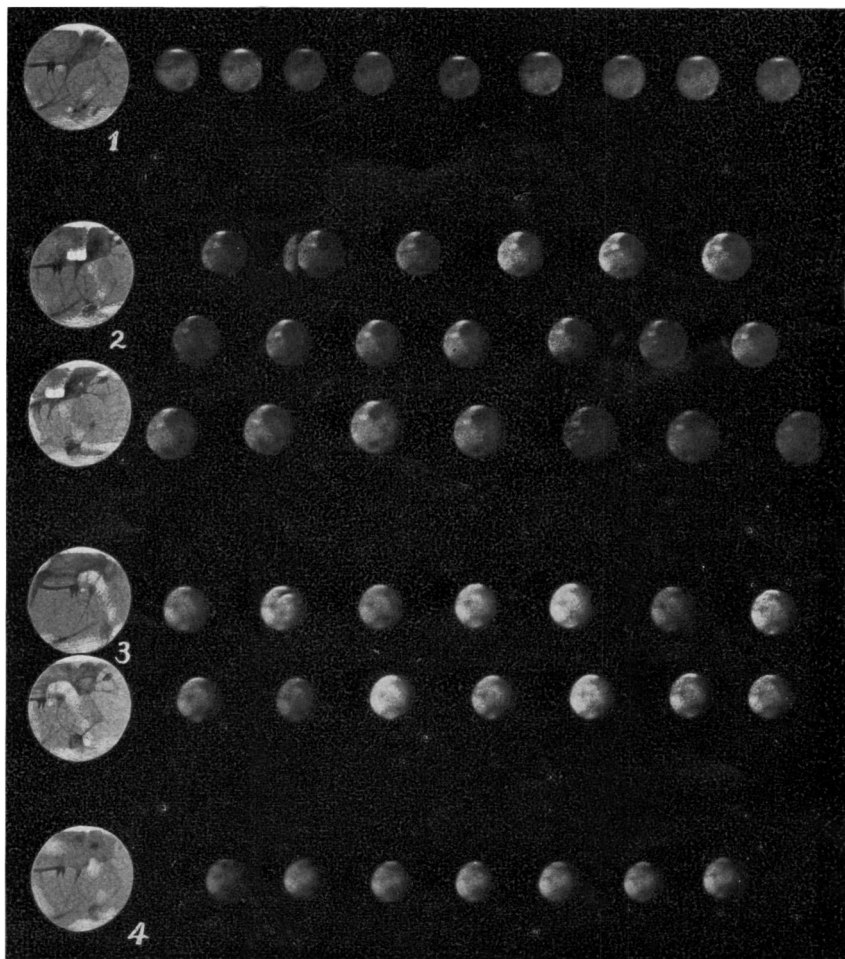
Lowell Observatory,
Flagstaff, Arizona,
July 18, 1922.

OBSERVATIONS OF THE FAINT NEBULAR STRUCTURE AROUND
R AQUARI

It would be of interest to learn if changes occur, in comparatively short time intervals, in the faint nebular structure around R Aquarii, and if these are dependent in any way upon the light changes of the star. We may expect other correlations of a more obscure nature to be brought to light by further work. From Merrill's spectrum observations of the star, and the appearance of the nebular structure in the direct photographs, it seems reasonable to expect an intimate physical relationship between the star and nebulosity rather than merely an apparent association resulting from projection of two objects which might be widely separated in space.

The nebular structure was discovered in November last year¹ and the star was followed until near its maximum light in January. Several exposures have recently been made with the 40-inch Lowell reflector, during June and the first days of July, but the unfavorable position of the star in the morning sky has thus far prevented securing photographs of the best definition and with sufficient intensity for accurate comparisons with negatives made near the last maximum. The recent observations—on the light curve approaching the broad flat minimum of small variation, if the predicted time of minimum light is approximately correct—indicate no marked changes in brightness or form of the nebular structure, judging from the

¹Publications American Astronomical Society; Twenty-seventh Meeting.
Popular Astronomy, 30, 162, 1922.



1. Independent drawing July 8 (left) and photographs June 6 (right) showing normal appearance of planet with no trace of white spot.
2. Independent drawings July 9 (left) and photographs July 9 (right) from three different plates showing the great white spot.
3. Independent drawings July 10 (left) and photographs July 10 (right) showing change in white spot.
4. Independent drawings July 12 (left) and photographs July 12 (right) showing last remnant of spot.

PLATE I. MARS 1922

The photographs were taken through the 24-inch refractor and an orange color screen which made the white patches fainter than if taken with blue light.
 Lowell Observatory.

By E. C. SLIPHER.